C1 Concl.

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~~a receiver capable of simultaneously receiving a plurality of said signal waves from a plurality of propagation paths including a line of sight propagation path to said transmitter and said at least one indirect propagation path, and receiving said signal wave from at least one of said plurality of propagation paths.~~

REMARKS

Status of Claims

Claims 1-40 are pending in the above-identified application. Claims 1, 11, 15, and 18 are independent.

Request for Initialed Copy of PTO Form 1449

The initialed 1449 for the IDS submitted August 28, 2000 has not been received. Applicants respectfully request that the Examiner provide an initialed copy of the PTO Form 1449 for the IDS submitted August 28, 2000.

Claim Rejections

Rejection under 35 U.S.C. 102(e)

Claims 1, 2, 7, 8, 11, 18-25, 30-35, 38 and 39 have been rejected under 35 U.S.C. §102(e) as being anticipated by Wax et al. (U.S. Patent 6,249,680, hereinafter Wax). Applicants respectfully traverse that rejection.

Wax

Wax is directed to methods for determining the location of cellular

telephones, and in particular in severe multipath urban environments. Wax addresses multipath as a primary problem in location finding. Specifically, Wax defines multipath as being caused by reflection of signals from objects in the operation environment, such as buildings, hills, and other structures (col. 1, ll. 31-34). Wax further states that multipath signals not only have different directions from the direct signal, but different delays as well (col. 1, ll. 37-39). Thus, Wax concludes that multipath is a problem for location-finding systems based on direction finding, as well as location-finding systems based on time-of-arrival measurements (col. 1, ll. 39-41).

Wax discloses some examples of multipath signal propagation (Figure 1). A phone 30, for example, transmits a signal to the base station 38. However, part of that signal travels line-of-sight to the base station, while other parts are reflected, and subject to a delay, by buildings 32, 34 and 36 before being received by the base station 38. In the case of a phone 46, only an indirect signal reflected by building 36 is received by the base station. Its line-of-sight signal does not arrive at the base station 38. Thus, by these examples, multipath signals complicates the problem of accurately determining the true location of a transmitter.

To solve the problem of signals arriving from different directions and at different delays, Wax provides a location finding method where signals from a mobile transmitter are sent to an antenna array of a base station receiver (col. 4,

ll. 22-28). The location finding system relies on CDMA and isolation of multipath parts of a signal, p received signals, having differential delay of more than one chip length (col. 6, ll. 55-57; col. 6, l. 66, to col. 7, l. 10). The base station determines a signal signature from the received signals (col. 4, ll. 28-29). The base station (76) disclosed in Wax has an array of antennas (80, 82, 84; col. 5, ll. 49-54) for receiving the multipath signals from a phone (74).

Differences from Wax

Independent claim 1 is directed to a millimeter band signal transmitting/receiving system. The transmitting/receiving system is arranged such that a plurality of signal waves over a plurality of propagation paths are simultaneously received at a receiver. That arrangement helps to ensure that at least one signal wave is received, and when more than one signal wave is received, there is a minimum adverse affect (see specification, p. 8, ll. 19-28). The transmitting/receiving system is arranged in a house for transmitting video signals. Applicants submit that Wax fails to teach or suggest at least, "a receiver simultaneously receiving a plurality of said signal waves from a plurality of propagation paths including a line of sight propagation path to said transmitter and said at least one indirect propagation path."

The Final Office Action alleges that the claimed receiver is taught in Wax by Figure 1, and associated disclosure at column 1, lines 30-37. Although it is not clear what the Final Office Action alleges as constituting the receiver, for the

sake of argument Applicants assume that the base station receiver 146 is alleged to constitute the claimed receiver. However, Wax discloses that a problem with multipath signals is that they not only have different directions from the direct signal, but different delays as well (col. 1, ll. 37-39). Thus, Wax does not teach, for example, simultaneously receiving a signal wave over a line of sight propagation path and another signal wave over at least one indirect propagation path, the signal wave transmitted from the same transmitter. According to Wax, a signal transmitted in an indirect propagation path originating from a phone would have a delay, i.e. take longer, compared to a signal in a line of sight propagation path. In other words, multipath signals would not be received at the same time as line of sight signals. Thus, Applicants submit that Wax does not anticipate the claimed invention in claim 1.

Independent claim 11, in a preferred embodiment, is directed to a millimeter band signal transmitting/receiving system, and in particular to an embodiment having a plurality of transmitters. In this embodiment, a plurality of transmitters provide the desired plurality of signal waves without the need for reflectors (see, for example, Figure 5). In order to prevent interruption, local oscillator frequencies for the transmitters are the same so that frequencies of the corresponding transmitted waves are the same. Applicants submit that Wax does not teach or suggest at least, "a receiver arranged to simultaneously receive a plurality of signal waves output from said plurality of transmitters" and "said

plurality of transmitters having a same frequency."

The Final Office Action alleges that the base station 38 constitutes the claimed receiver and that phones 30 and 50 constitute the claimed transmitters. In a fair reading of Wax, however, Applicants find no teaching or suggestion of, for example, transmitters 30 and 50 having the same frequency and the base station simultaneously receiving signal waves output from the transmitters. In a statement concerning problems with signals coming from more than one phone, Wax discloses "three additional cellular phones 40, 42, and 44 appear to be transmitting similar signals from different directions and at different distances." There is no disclosure whatsoever of the phones set to transmit at the same frequency. Wax at most discloses that different phones are at different distances. Accordingly, Applicants submit that Wax does not anticipate the claimed invention of claim 11.

Independent claim 18 is directed to a millimeter band signal transmitting/receiving system having at least one transmitter having an associated transmit antenna and a receiver having a receive antenna. The receive antenna receives a transmitted signal through each of the plurality of propagation paths including a line of sight propagation path, unless the line of sight propagation path is obstructed. Due to the capability of the receiver to receive the signal though the plurality of propagation paths, good reception is achieved even when the propagation path of the line of sight path is obstructed

(specification, p. 9, ll. 12-15). Applicants submit that Wax does not teach or suggest at least "a receiver receiving the signal through said receive antenna."

The Final Office Action alleges that the base station 38 constitutes the claimed receiver receiving a signal through a single receive antenna. However, Wax discloses that the base station 38 has a number of antennas forming an antenna array (col. 5, ll. 53-54; Fig. 5, antennas 134). Further, Wax does not disclose, for example, where a single antenna in the antenna array receives a signal along a plurality of propagation paths including a line of sight propagation path. Accordingly, Applicants submit that Wax does not anticipate the claimed invention of claim 18.

With respect to dependent claims 2, 7, 8, 19-25, 30-35, 38, and 39, for the same reasons as above for claims 1, 11, or 18, Applicants submit that they likewise are no anticipated by Wax. Accordingly, Applicants respectfully request that the rejection under 35 U.S.C. 102(e) be withdrawn.

Rejection under 35 U.S.C. 102(b)

Claims 9 and 10 have been rejected under 35 U.S.C. 102(b) as being anticipated by Freeburg et al. (U.S. Patent 5,355,520, hereinafter Freeburg). Applicants respectfully traverse that rejection.

Claim 9 depends from claim 1 and claim 10 further depends from claim 9. Claim 1 has been rejected under 35 U.S.C. 102(e) as being anticipated by Wax. Thus, the rejection of claims 9 and 10 under 35 U.S.C. 102(b) is improper.

Applicants respectfully request that the rejection be withdrawn.

Rejection under 35 U.S.C. 103(a); Freeburg and Wax

Claims 4-6, 15-17, 36, and 37 have been rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Freeburg and Wax. Applicants respectfully traverse that rejection.

Freeburg et al. '520 (repeated for purposes of completeness)

Freeburg et al. is directed to a wireless in-building RF communication system operating in a microwave frequency range which is also utilized by a nearby point-to-point microwave communication system to allow for frequency reuse. Central modules and user modules each consist of RF transceivers and antenna systems. The wireless communication system includes a mechanism for limiting the magnitude of RF signals transmitted by it to be less than a predetermined level sufficiently small to prevent interference with the nearby point-to-point communication system.

As shown in Freeburg et al. Figures 1 and 3, control module 12 acts as a node which is capable of communication with each of user modules 14. Control module 12 and each of user modules 14 consists of a microwave RF transceiver capable of communications with each other. Each user module 14 contains a plurality of directional antennae 16; Freeburg et al. '520 prefers that control module 12 contains the same antenna arrangement, permitting the best antenna

at control module 12 and the best antenna at user module 14 to be selected for communications therebetween.

External window 22 represents openings or ports through which microwave RF signal transmitting inside the building can escape without substantial attenuation. Freeburg et al. has, as one of its objectives, the control of undesired radiation of RF signals generated within the building, to allow concurrent use with other communication systems operating at the same frequencies, for example, microwave point-to-point transceiver 26 that utilizes the same frequencies as the RF LAN system in building 10.

Freeburg et al. uses an antenna selection technique using various parameters, and user module 14 and control module 12 are each capable of selecting the most appropriate antenna to facilitate communications between a particular control module 12 and user module 14. Freeburg et al. '520 chooses the antenna based on criteria including the amount of RF energy radiated outside the building, and which may interfere with the point-to-point microwave communication system located nearby. Further, the distance between an exterior window from which the RF LAN signals are radiated and the receive antenna of an external point-to-point microwave receiver is established as a separation distance determined by at least the capture ratio of the point-to-point system. From this information, Freeburg et al. '520 derive the minimum acceptable distance that the RF LAN system may be located with respect to the

center beam of the point-to-point communication system antenna.

With this restriction in mind, Freeburg et al. '520 employs switching of alternate antennae to preclude exceeding the allowable RF transmission level outside of the building. For example, Figure 4 of Freeburg et al. illustrates an internal arrangement of antenna switching inside user module 14. Opening the respective switch can disable each of the six antennas within user module 14. These switches provide a means for inhibiting certain antennae, thereby minimizing outside radiation levels that would have been caused by the use of such antennae. Applicants further note that user module 14 contains an RF transceiver, and multiple independent antennas.

Differences over Freeburg and Wax

Claims 4-6 are directed to further limitations for the reflector, recited in claim 2. The reflector is arranged to redirect a signal wave to the receiver. Alternative materials have been found to provide suitable reflection of the wave to give an adequate intensity, and at the same time not impair the appearance of the house (specification, p. 10, l. 21, to p. 11, l. 17). The Final Office Action relies on Freeburg for teaching the missing reflector materials not disclosed in Wax. Using claim 4 as an exemplary claim, the Final Office Action states as a reason to rely on the teachings of Freeburg, "it would have been obvious to one of ordinary skill in the art to use a certain kind of material such as aluminum or metal to reflect signals." Applicants submit that one of ordinary skill in the art

would not be motivated to apply materials such as aluminum for use as reflectors in the wireless communication system of Wax.

Wax is directed to methods for accurately determining the location of a transmitter in a wireless communication system subject to severe multipath signals. The objects that typically cause the multipath signals are objects in the environment, such as buildings, hills, or other structures. They are not objects that would be arranged as part of the design of the system. Thus, Applicants submit that the teachings in Freeburg are not of the nature that would be in any way combinable with the system of Wax. For example, Applicants submit that one of ordinary skill in the art would not be motivated to construct buildings to have aluminum for purposes of serving as reflectors for guiding waves to a base station. Furthermore, the motivation statements made in the Final Office Action are conclusionary in nature and do not provide a motivation, suggestion, or teaching of the desirability of combining the teachings of Freeburg with Wax. Thus, Applicants submit that the Final Office Action has failed to present a *prima facie* case of obviousness for claims 4-6.

Claim 15 is directed to a house provided with a millimeter band signal transmitting/receiving system including a structural component defining an internal space. Applicants submit that Wax, either alone or in combination, fails to teach or suggest at least “a receiver simultaneously receiving a plurality of signal waves through a plurality of propagation paths including a line of sight

propagation path to said transmitter and said at least one indirect propagation path," as recited in claim 15.

The Final Office Action alleges that Freeburg teaches all of the claimed invention of claim 15, except a receiver simultaneously receiving a plurality of signal waves. The Final Office Action alleges that the claimed receiver is taught in Wax by Figure 1, and associated disclosure at column 1, lines 30-37. However, Wax discloses that a problem with multipath signals is that they not only have different directions from the direct signal, but different delays as well (col. 1, ll. 37-39). Thus, Wax does not teach, for example, simultaneously receiving a signal wave over a line of sight propagation path and a signal wave over at least one indirect propagation path. According to Wax, an indirect propagation path originating from a phone would have a delay compared to a line of sight propagation path. Thus, Applicants submit that Wax does not make up for the deficiency in Freeburg, and therefore neither Wax nor Freeburg, either alone or in combination, teach or suggest all of the claimed elements of claim 15 as alleged in the Final Office Action.

In addition, Applicants submit that the motivation statement provided in the Final Office Action that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide simultaneous diversity reception at the receiver in order to receive different multipath signals from different directions," constitutes hindsight since the only source of that teaching

is the present specification. Further, Freeburg discloses a communications system wherein a control module and a user module each select the most appropriate antenna for communications, i.e., one antenna to one antenna communication. Thus, Applicants submit that it would not have been obvious at the time of the invention to secure a plurality of transmission paths in advance. Furthermore, as noted above, Wax does not teach the claimed simultaneous receiving function of the receiver. Thus, at least for this additional reason, Applicants submit that *prima facie* obviousness has not been set forth in the Final Office Action for claim 15.

With respect to dependent claims 16, 17, 36, and 37, for the same reasons as above for claim 15, Applicants submit that they likewise are not unpatentable over the Wax and Freeburg, either alone or in combination. Accordingly, Applicants respectfully request that the rejection of claims 4-6, 15-17, 36, and 37 under 35 U.S.C. 103 be withdrawn.

Rejection under 35 U.S.C. 103(a); Wax and Kagami

Claims 12, 13, and 26 have been rejected under 35 U.S.C. 103 as being unpatentable over the combination of Wax and Kagami et al. (U.S. Patent 5,479,443, hereinafter Kagami). Applicants respectfully traverse that rejection.

<u>Differences over Wax and Kagami</u>

Claims 12 and 13 are directed to the transmitter/receiving system having a plurality of transmitters, each including a local oscillator oscillating at a prescribed frequency for generating a signal wave at the same frequency and/or in synchronization with each other. As an alternative, claim 26 is directed to a system having two transmitters share a common oscillator. As mentioned above with respect to claim 11, local oscillator frequencies for the transmitters are the same so that frequencies of the corresponding transmitted waves are the same, in order to prevent interruption. As in the above for claim 11, Applicants submit that Wax does not teach or suggest at least, "a receiver arranged to simultaneously receive a plurality of signal waves output from said plurality of transmitters." As mentioned above for claim 11, Applicants find no teaching or suggestion of, for example, transmitters 30 and 50 having the same frequency and the base station simultaneously receiving signal waves output from the transmitters. Therefore, Wax fails to teach or suggest all elements of claims 12, 13 and 26 as alleged in the Final Office Action.

The Final Office Action relies on Kagami for teaching the claimed limitations of a local oscillator in each of a plurality of transmitters for generating a signal wave at the same frequency, or, for teaching a common local oscillator between transmitters. Kagami, however, is directed to a radio relay

system and no teaching or suggestion is provided for combining the teachings of Kagami with the location finding method of Wax. Further, the Final Office Action states as a motivation for claim 12 that, "it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a common frequency for the transmitters to generate simultaneous signals." Applicants submit, however, that the motivation statement does not provide a rational for combining the teachings of Kagami with Wax. Neither the Final Office Action, nor either the Wax or Kagami references, provide a motivation to incorporate a local oscillator generating the same frequency for each of a plurality of transmitters, or to incorporate a common oscillator for a plurality of transmitters, where the transmitters are, for example, the phones in Wax. In other words, Kagami does not teach or suggest, for example, a rational for having phones, such as in Wax, transmit at the same frequency so that a receiver, such as Wax's base station, can receive their signals simultaneously. Thus, Applicants submit that a *prima facie* case of obviousness has not been made for combining Wax and Kagami. Thus, claims 12, 13, and 26 are not unpatentable over Kagami and Wax, either alone or in combination. Accordingly, Applicants request that the rejection of claims 12, 13, and 26 under 35 U.S.C. 103 be withdrawn.

Rejection under 35 U.S.C. 103(a); Wax and Evans

Claim 27 has been rejected under 35 U.S.C. 103 as being unpatentable over the combination of Wax and Evans et al. (U.S. Patent 5,920,813, hereinafter

Evans). Applicants respectfully traverse that rejection.

Differences over Wax and Evans

At least for the same reasons as above for claim 18, all elements of claim 27 are not taught or suggested by Wax. Evans is relied on in the Final Office Action for teaching the limitation wherein a millimeter signal is a video signal. Evens does not, however, make for the deficiency in Wax of a receiver having a single receiving antenna that receives a signal through a plurality of propagation paths. Accordingly, Applicants submit that Wax and Evans, either alone or in combination, fail to teach or suggest all claimed elements of claim 27. Therefore, Applicants respectfully request that the rejection of claim 27 under 35 U.S.C. 103 be withdrawn.

Rejection under 35 U.S.C. 103(a); Wax, Freeburg and Keskitalo

Claim 40 (as well as 28 and 29) have been rejected under 35 U.S.C. 103 as being unpatentable over Freeburg and Wax, as well as Keskitalo et al. (U.S. Patent 6,128,486, hereinafter Keskitalo). Applicants respectfully traverse that rejection.

Differences over Wax, Freeburg, and Keskitalo

Claims 28, 29 and 40 are directed to the further limitation of a side lobe of a transmit antenna for transmitting a line of sight propagation path and a main lobe for transmitting a plurality of propagation paths except for the line of sight

propagation path. Applicants submit that at least for the above reasons with respect to claims 15 and 18, from which claims 28, 29 and 40 depend, all claimed elements are not taught or suggested by Wax, Freeburg and Keskitalo, either alone or in combination. Furthermore insufficient motivation to combine the references is present in the Final Office Action. For example with respect to claim 28, the Final Office Action states as a motivation that, "it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a side lobe to signal the incoming beam direction of the signal from the transmitter." Keskitalo, however, is primarily concerned with features of a base station receiver, and Applicants submit that nowhere does it teach or suggests, for example, wherein the terminal equipment 102 or 502 includes a side lobe or main lobe, associated therewith. Therefore, Applicants submit that a *prima facie* case of obviousness has not been made, and respectfully request that the rejection of claims 28, 29 and 40 under 35 U.S.C. 103, be withdrawn.

Conclusion

In view of the above amendments and remarks, reconsideration of the rejections and allowance of each of claims 1-40 in connection with the present application are earnestly solicited.

If there are any outstanding matters remaining in this application, the Examiner is invited to contact Robert W. Downs (Registration Number 48,222) in the Washington, D.C. area at (703) 205-8000 in order to discuss these matters.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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MARKED-UP COPY OF THE CLAIMS

1. (Twice Amended) A millimeter band signal transmitting/receiving system, comprising:

a transmitter transmitting a signal wave;

a propagation path forming portion forming at least one indirect propagation path for propagation of said signal wave; and

a receiver capable of simultaneously receiving a plurality of said signal waves from a plurality of propagation paths including a line of sight propagation path to said transmitter and said at least one indirect propagation path, and receiving said signal wave from at least one of said plurality of propagation paths.